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FARMERS' SELECTION CUES IN COWPEA FOR VEGETABLE USE IN EASTERN UGANDA

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ABSTRACT

A participatory cowpea varietal selection was carried out in Eastern Uganda in Kumi district among farmers (n=30) in the sub-Counties of: Ongino, Kumi and Kanyum. A range of opinions were collected to identify farmers' selection criteria based on different sensory attributes and their most preferred genotypes for vegetable use. A preference analysis was carried out to obtain quantitative preference scores of each plot. This was followed by organoleptic tests which included attributes like taste, aroma and texture of the genotypes at the vegetative and immature R4 stages. Focus group discussions (FGDs) were also held to find consensus of the independent evaluations made by individual farmers. Data for sixteen (16) cowpea genotypes were collected at the different above mentioned stages. Quantitative data were analyzed based on farmers' scores made on the different evaluated attributes and ANOVA was used to provide mean differences between location, gender and genotype at a significant level of 5%. Preference score for each of the varieties tested was determined and presented. Data from FGDs were grouped, similarities and differences were later determined depending on their level of importance to the farmers. Significant differences ($p<0.05$) in farmer choices were observed for leaf taste, immature pod aroma, taste and texture; mature pod aroma, taste between farmer groups, age genotype and gender. Irrespective of age, gender, farmer group and genotype, farmers seemed to give more importance to the smooth texture, little hard leaves when chewing, sweet taste with a mild aroma (leaves) and a moderate aroma (pods). Majority (9%) of the farmers preferred Ebelat (landrace) at V4 stage; this was followed by Danila (8.7%). On the other hand, UCUCOW1 (13% at immature and 10.2% at mature cooked R4 stage) followed by Ebelat (9% and 9.8% for immature and mature R4 stage, respectively) were preferred by majority of the farmers. In terms of sensory attributes, farmers preferred genotypes with sweet taste, moderate aroma and tender texture. The information is a baseline for understanding key farmer selection criteria in utilization of cowpea as a vegetable which can be used in generating a demand-led variety design for the crop.

Key words: Farmer preferences, demand-led variety design, cowpea vegetable, sensory attributes

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INTRODUCTION

Cowpea (*Vigna unguiculata*) is a global vegetable whose cultivation is believed to have begun from Africa more than 5000 years ago [1]. It belongs to kingdom (*Plantae*), genus (*Vigna*), and Species (*unguiculata*) [2]. Cowpea is a valuable component in the farming systems of the majority of resource poor rural households in Sub-Saharan Africa (SSA) for its various attributes [3]. It is cultivated majorly as a vegetable as well as a cover and fodder crop [4]. The cowpea leaves, immature pods and mature pods are an important source of micro and macro nutrients like protein, crude fibre, minerals like (calcium, iron, zinc, phosphorus), and vitamins [5]. The tender green leaves contain 15 times more minerals, micro and macronutrients than in grains [6, 7]. In Uganda, cowpea is ranked third in importance [8] and Kumi district in Eastern Uganda is the largest producer and consumer of the crop with 90% of the country's production [8]. Consumption of cowpea leaves could offer an opportunity to reduce high prevalence of malnutrition especially among resource constrained rural and urban households in Africa and Uganda [9].

Cowpea is a neglected and an under-utilized crop in Africa. Research on cowpeas has focused mainly on its seed storage properties, seed yield potential, seed size, pest and disease tolerance, as a food security crop, and as a soil health crop [10]**.** Cowpea yield potential in sub-Saharan Africa is compromised by several biotic and abiotic factors such as insect pests, diseases (fungal, viral and bacterial), poor soil fertility, metal toxicity, and drought [11]. Development of improved varieties is needed for higher productivity and profitability. Further, employment of participatory variety selection (PVS) is a strategic way of bringing back the role of local farmers in identifying and developing suitable varieties for their location. Farmers' participation in early stages of any breeding program can contribute to the acceptance and adoption of newly developed varieties as their needs and expectations will likely be met [12].

This study aimed at understanding farmers' selection criteria of cowpea genotypes for vegetable use in Uganda. Since domestication of crops from the wild, traditional knowledge and skills of the local farmers has played a key role in maintaining crop and varietal diversity. As such the genetic make-up of such varieties was dynamic shaped by evolutionary forces. In that sense, plant selection by farmers has influenced important component of crop production systems. By involving the farmers in a participatory process in the various stages of selection, the approach aims to strengthen the dynamic farmer system of co-evolving and co-adapting varieties to the changing environment. Further farmers' expertise, their indigenous technical knowledge, and ecology and growing environment of the local varieties are synergistically integrated with appropriate scientific skill and knowledge [13]. Cowpea varieties have conventionally been bred for grain yield and fodder use [14], limited effort has been directed towards its development for vegetable use yet it forms an important staple source across sub-Saharan Africa. Cowpea leaves are commonly consumed in various forms and the pods are harvested when they are full-sized, just before they dry out, and then the grains are cooked and eaten as a vegetable. The consumption of cowpea as a fresh vegetable has rapidly increased in the semi-arid zone of Africa [11, 15]. There are no released varieties on record for vegetable use in Africa.

REFERENCES

1. **Ddungu SP, Ekere W, Bisikwa J, Kawooya R, Kalule DO and M Biruma** Marketing and market integration of cowpea (Vigna unguiculata L. Walp) in Uganda. *Journal of Development and Agricultural Economics*. 2015:1-11.

2. **Sastry KS, Mandal B, Hammond J, Scott SW, Briddon RW, Sastry SK, Mandal B, Sano T and J Hammond** Vigna unguiculata (Cowpea). *Encyclopedia of Plant Viruses and Viroids*. 2019: 2715-31.

3. **Molosiwa OO, Gwafila C, Makore J and SM Chite** Phenotypic variation in cowpea (Vigna unguiculata [L.] Walp.) germplasm collection from Botswana. *Int. J. Biodivers. Conserv.* 2016: 153-163.

4. **Mansaray A, Mark YK, Moseray MT, Kamara AY and AR Conteh** Effect of cowpea cultivar, planting date and application of insecticide in the management of cowpea insect pests in South Eastern Sierra Leone. *Journal of Entomology and Nematology*. 2020: 39-45.

5. **Emelike NJ, Ujong AE and SC Achinewhu** Proximate and sensory properties of moi-moi developed from cowpea and avocado pear seed flour blends. *Journal of Food Technology*. 2020:136-143.

6. **Oboh G, Oyeleye SI and AO Ademiluyi** The food and medicinal values of indigenous leafy vegetables. *In African Vegetables Forum*. 2017: 137-156.

7. **Okonya JS and BL Maass** Protein and iron composition of cowpea leaves: an evaluation of six cowpea varieties grown in eastern Africa. African Journal of Food, *Agriculture, Nutrition and Development.* 2014: 2129-40. 20.

8. **Tibagonzeka JE, Akumu G, Kiyimba F, Atukwase A, Wambete J, Bbemba J and JH Muyonga** Post-harvest handling practices and losses for legumes and starchy staples in Uganda. Agricultural Sciences. 2018: 141-56.

9. **Mundua J** Estimation of consumer preferences for cowpea varieties in Kumi and Soroti Districts, Uganda (Doctoral dissertation, Makerere University), 2010.

10. **Bouis HE, Saltzman A and E Birol** Improving nutrition through biofortification. Agriculture for improved nutrition: seizing the momentum. 2019: 28-47.

11. **Horn LN and H Shimelis** Production constraints and breeding approaches for cowpea improvement for drought prone agro-ecologies in Sub-Saharan Africa. *Annals of Agricultural Sciences* 2020; 83–91.

12. **Orawu M, Obuo PJ and RB Omadi** Participatory variety selection to enhance cowpea variety development and selection in northern region of Uganda. *Uganda Journal of Agricultural Sciences.* 2013; 57-73.

13. **Shamrova DP and CE Cummings** Participatory action research (PAR) with children and youth: An integrative review of methodology and PAR outcomes for participants, organizations, and communities. *Children and Youth Services Review*. 2017: 400-12.

14. **Garcia-Oliveira AL, Zate ZZ, Olasanmi B, Boukar O, Gedil M and C Fatokun** Genetic dissection of yield associated traits in a cross between cowpea and yard-long bean (Vigna unguiculata (L.) Walp) based on DArT markers. Journal of Genetics. 2020:1-3.

15. **Gonçalves A, Goufo P, Barros A, Domínguez-Perles R, Trindade H, Rosa EA, Ferreira L and M Rodrigues** Cowpea (Vigna unguiculata L. Walp), a renewed multipurpose crop for a more sustainable agri-food system: nutritional advantages and constraints. *Journal of the Science of Food and Agriculture*. 2016:2941-51.

16. **Ddamulira G, Santos CA, Alanyo M, Ramathani I and M Maphosa** Maturity, protein content and yield stability of cowpea in Uganda. *South African Journal of Plant and Soil.* 2017: 255-61.

17. **Nakakeeto M** Assessment of the appraisal and disposal of records at Uganda National Meteorological Authority (UNMA) (Doctoral dissertation), 2019.

18. **Njira KO, Semu E, Mrema JP and PC Nalivata** Biological nitrogen fixation by pigeon pea and cowpea in the doubled-up and other cropping systems on the Luvisols of Central Malawi. *African Journal of Agricultural Research*. 2017: 1341-52.

19. **Nielsen SS, Ohler TA and CA Mitchell** Cowpea leaves for human consumption: production, utilization, and nutrient composition. *Advances in cowpea research*. 1997:326-32.

20. **Abu-Assab S, Baier D and M Kühne** Preference Analysis and Product Design in Markets for Elderly People: A Comparison of Methods and Approaches. *Studies in Classification, Data Analysis, and Knowledge Organization,* 2010.

21. **Phebean IO, Akinyele O, Toyin A, Folasade O, Olabisi A and E Nnenna** Development and quality evaluation of carrot powder and cowpea flour enriched biscuits. *International Journal of Food Science and Biotechnology*. 2017:67-72.

22. **Ekholuenetale M, Barrow A, Ekholuenetale CE and G Tudeme** Impact of stunting on early childhood cognitive development in Benin: evidence from Demographic and Health Survey. *Egyptian Pediatric Association Gazette.* 2020: 68:31.